PERSONAL VARIABLES AFFECTING ADOPTION OF AGRICULTURAL INNOVATIONS BY NIGERIAN FARMERS

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ABSTRACT

This is a descriptive study aimed at finding how personal variables affect the adoption of agricultural innovations by farmers in Nigeria. Questionnaires and interviews were used as instruments for the generation of data. The totality of Nigerian farmers comprised the population of the study and sampling was based on the cluster approach using the purposive procedure to select one hundred farmers from each of the five ecological zones of the country. The data collected were analysed using the Statistical Package for the Social Sciences and the One-Way Analysis of Variance used for statistically testing the hypotheses. The analysis showed that significant differences existed among farmers in the adoption of innovations on account of educational qualifications, farm size and mean perception of their various access times. Post-hoc tests, using Scheffes Difference Test identified areas where the differences existed. Among farmers with high and higher education there was no significant difference in adoption, neither between illiterates and primary school leavers; but between the former and latter groups significant differences existed. Between medium and large-scale farmers, there was no significant difference, but between them and small-scale farmers a significant difference was found in the adoption level of agricultural innovations. Farmers with medium and long time access to information had no significant difference in adoption of innovations, but between them and those with short time access, a significant difference existed.

1. INTRODUCTION

Adoption is accepting and actually using new improved techniques and/or technologies. Extension, whether in agriculture or any field is meant to educate beneficiaries to accept changes, i.e. extension services encourage beneficiaries to adopt new techniques. Agricultural extension is to some extent concerned with the transmission of information on innovations or improved techniques/technologies in agricultural systems with the aim of getting better systems than had hitherto been obtainable. Adoption or the use of improved techniques/technologies therefore is capable of making farmers more productive.

The National Agricultural Extension and Research Liaison Services (NAELRS, 1993) has been in the vanguard for the dissemination of "proven and relevant

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agricultural innovation: in Nigeria. To do this effectively it has zonal offices in all the ecological zones of Nigeria with headquarters at Baddegi (Bida), Ibadan, Maiduguri, Umudike and Zaria. Figure 1 shows the NAERLS zones and their headquarters.

Figure 1: NAERLS zones and headquarters

The NAERLS, as the national agricultural extension and research liaison co-ordinating body, has been communicating innovations to farmers in Nigeria for quite a period of time through the dissemination of information and practical demonstration by its field staff. The extension activities of the NAERLS, especially information dissemination, undoubtedly must have raised the adoption levels of the farmers to whom they have been targeted. The finding of Akanya *et al* (1991:87) with respect to Borno State Agricultural Project lends evidence to this position. The purpose of this research was to find out from the beneficiaries of NAERLS information services the extent to which some of their personal variables affect their adoption of innovations recommended by these services.

The following hypotheses were tested:

1. There is no significant difference in the adoption of agricultural innovations/technologies by farmers with varying educational qualifications.

2. There is no significant difference in the adoption of agricultural innovations / technologies by small-scale, medium scale and large-scale farmers.

3. There is no significant difference in the mean perception of respondents of various information access time in the adoption of innovations.

2. LITERATURE REVIEW

On their own, farmers may not just adopt agricultural innovations. This could be because of ignorance, inability to afford new techniques / technologies etc. There are different variables which induce adoption, among them the sources of information used in communicating to farmers, institutional factors, socio-economic factors, etc. Some variable cannot be grouped into a watertight compartment

The degree of interest a user has in a particular source of information goes a long way to determine the extent to which he uses the information or message conveyed by that source, and consequently adopts the innovation(s) prescribed. Hooks (1983), Obibuaku and Mustafa (1978) and a host of other researchers agree with communication experts that availability of information is an impetus for the acceptance of innovations. Onweagba and Anyanwu (1992) investigated ten likely sources of information that would induce farmers to adopt innovations in Anambra and Imo States of Nigeria. They found that seven of these sources: "extension agents, television programmes, agricultural show, fellow farmer and friends, ADP newsletter, staff of research institutes and radio farmer were the best predictors of adoption behaviour". The three remaining sources – farmers cooperatives, posters and village heads were found not to be as effective because information services using them were not as sustained as the seven effective sources.

Osuji (1983) identified among others lack of access to education, failure of extension workers to visit farmers and lack of financial assistance (from government) as the institutional factors hindering the acceptance of innovations by farmers. To him therefore, if farmers have access to evening classes (or adult education), are visited by extension workers and assisted financially they would accept innovations passed to them.

Studies on socio-economic factors affecting the adoption of innovations are many. While certain findings establish that given factors influence adoption, in another setting these same factors may not positively influence adoption of innovations. In most, if not all instances however, some factors, e.g. education

has been found to be constant in positively impacting on the adoption of innovations (Obinne, 1991 and Okoye, 1989).

Okoye (1989) found that social characteristics like education, farm size, literacy, social participation, etc. influenced adoption of innovations while the age of farmers, social status, farm income, etc. did not influence adoption by farmers in Anambra State of Nigeria. Osuji (1983) reports that adoption is positively related to level of education. This is to say that while illiteracy hinders farmers' adoption of innovations, still among the educated farmers, the longer the education the more chances that they will adopt innovations more readily. This position finds support in Chaudhri (1979) as reported in Okoye (1989).

These works reviewed above have only shown which factors do or do not influence the acceptance of innovations. For example, at best under education it was reported that the longer the education the more likely the farmer will accept innovations. In this present study which deals with how three personal factors – education, length of time of access to agricultural information and scale of farming (farm size) impact on adoption of innovations, differences will be shown for each variable or factor how their levels of extent influence adoption.

3. METHODOLOGY

The survey research method was adopted for this study whose population comprised Nigerian farmers. Cluster sampling using the purposive procedure was employed to select one hundred farmers from each of the five ecological zones of Nigeria, thus making up a total of five hundred farmers as the sample of this study. The study was conducted between October and December, 2000.

The instruments used for the collection of data for this study were questionnaires and interviews. The questionnaire sought to find out from the farmers their educational qualifications, scale of farming or farm size and length of time of access (i.e. number of years) they have been accessing NAERLS information services. The questionnaire probed further to find out whether in using these services, the three variables (qualifications, scale of farming and years of access to information) have had impact on Nigerian farmers' adoption of the innovations disseminated through NAERLS information services.

Copies of the questionnaire were administered to farmers in each of the five zones using enumerators or research assistants, who on interviewing the farmers ticked their appropriate responses.

The data generated for the study were analysed using the Statistical Package for the Social Sciences (SPSS). The One-way Analysis of Variance (ANOVA) was used to test the three hypotheses for the study. It was used because all the hypotheses tested differences of one variable each among more than two groups. These included differences in adoption of innovations among farmers on account of educational qualifications, scale of farming and number of years of access to NAERLS information.

For the differences that existed among the groups as revealed by the ANOVA results, post-hoc tests using Scheffe's Difference Test were carried out. These latter tests were undertaken to indicate the groups the differences existed. The alpha level of significance was 0.05.

4. FINDINGS

The findings are presented descriptively and statistically.

4.1 Response rate

The response rate of the questionnaire administered in the five NAERLS zones is shown in Table 1.

Table 1: Farmers' response rate

Question-naire	Zones					
	N. Central	**N. East**	**N. West**	**S. East**	**S. West**	**Total**
Administered	101	100	100	100	100	501
Returned	101	100	100	96	98	495

In all, a total of 495 farmers' questionnaires representing a response rate of 99% were returned, all of which were usable. A near hundred percent validity was achieved for the returned questionnaires because of the use of trained enumerators from NAERLS offices, ADP's and research institutes in the zones visited.

4.2 Educational qualifications

Table 2 shows the educational levels of the respondents.

Table 2: Educational qualifications of respondents

Qualifications	Zones										Total	
	N. Central		N. East		N. West		S. East		S. West			
	Freq	%	Freq	%	Freq	%	Freq	%	Freq	%	Freq	%
None	36	35.6	20	20	3	3	20	20	49	49	128	25.9
Primary	16	15.8	21	21	16	16	33	34.4	30	30	116	23.4
O'level / Diploma	22	21.8	21	21	25	25	36	37.5	17	17	121	24.4
Bachelor / Master / PhD	1	1.0	5	5	-	-	6	6.3	1	1	13	2.6
Others	26	25.7	33	33	56	56	1	1.0	1	1	117	23,6
Total	**101**	**100**	**100**	**100**	**100**	**100**	**96**	**100**	**98**	**100**	**495**	**100**

One hundred and twenty-eight respondents, i.e. 25.9% had no educational qualification. The respondents with primary school education were 116 (23.4%) while those with ordinary level and diploma qualifications accounted for 24.4% of the total at a figure 0f 121. The respondents with university degrees numbered 13 (2.6%) of the total. They included eight first-degree holders, four Master's degree holders and one PhD holder. The respondents with qualifications not classified in the questionnaires numbered 117 (23.6%).

The responses given under qualifications classified as "others" included Arabic and Islamic education, adult and non-formal education, etc. Most of the respondents with qualifications that fell into the group O' Level and Diploma had West African School Certificate (WASC) or equivalent qualifications. They numbered 73. The remaining 48 respondents in this group had either Higher School Certificate (HSC), National Certificate in Education (NCE) or Polytechnic diploma.

Some ignorant people regard those having them as illiterates. Granted that the 117 (23.6%) respondents having 'other' qualifications are taken as 'illiterates', it means that the 'illiterates' in this study numbered 245 (49.5%) of the total number of respondents. This is much less than the figure of 70% Nigerian farmers being illiterate as held by Adimorah and Ugoji (1997:40).

4.3 Scale of farming

Three hundred and fifty (70.7%) respondents were small-scale (subsistence) farmers. Medium scale farmers numbered 128 (25.9%) while there were only 17 (3.4%) large-scale farmers. This finding agrees with the position of Aina and Adedigba (1995:84) that most Nigerian farmers are subsistence farmers.

4.4 Number of years of access to NAERLS information services

The number of years of access to NAERLS information services by the respondents is shown in Table 3.

In terms of the respondents' access time to any form of NAERLS information, Table 3 shows that 102 (20.6%) respondents have had access for 1 to 5 years and 109 (22%) other respondents have had access for the past 6 to 10 years. hose with 11 to 15 years access time numbered 86 (17.4%), and those with 16 to 20 and more than 20 years access time numbered 90 (18.2%) and 108 (21.8%) respectively.

Table 3: Respondents access time to NAERLS information services

Length of access time	Zones										Total	
	N. Central		N. East		N. West		S. East		S. West			
	Freq	%	Freq	%	Freq	%	Freq	%	Freq	%	Freq	%
1 – 5 years	16	15.8	8	8	8	8	40	41.7	30	30.6	102	20.6
6 – 10 years	34	33.7	17	17	5	5	22	22.9	31	31.6	109	22.0
11 – 15 years	22	21.8	21	21	21	21	9	9.4	13	13.3	86	17.4
16 – 20 years	24	23.8	21	21	23	23	10	10.4	12	12.2	90	18.2
> 20 years	5	5.0	33	33	43	43	15	15.6	12	12.2	108	21.8
Total	**101**	**100**	**100**	**100**	**100**	**100**	**96**	**100**	**98**	**100**	**495**	**100**

4.5 Statistical analysis

This is based on the testing of the three hypotheses for the study and the results obtained.

Hypothesis I: There is no significant difference in the adoption of agricultural innovations / technologies by farmers with varying educational qualifications.

Table 4a: Comparative analysis of farmers' qualifications and adoption of innovations (one way ANOVA) (N = 495)

Group	Comparison of adoption of innovations by educational qualifications			
	N	$\overline{X}$	SD	SE
No. qualification	128	3.9778	0.5617	0.0496
Primary	116	3.9469	0.7099	0.0659
O' Level & Diploma	121	4.0604	0.6108	0.0555
Graduates	13	4.2249	0.4980	0.1381
Others	117	4.3537	0.4675	0.0432

Table 4b: ANOVA summary table

Source	DF	SS	MS	F' Ratio	F' Cript	P
Between groups	4	12.4579	3.1145	8.9178	2.39	0.0000*
Within groups	490	171.1277	0.3492			
Total	**494**	**183.5856**				

* Significant; p = < 0.05

Null Hypothesis 1 is rejected because there is a significant difference between the level of educational qualifications of respondents and the adoption of agricultural innovations and technologies. This is because the F' critical value of 2.39 is less than the F' calculated value of 8.9178.

Table 5 shows the result of the Post-hoc test to determine which of the educational groups the difference was attributable to.

Among O'level / Diploma holders, graduates and respondents with "other qualifications" with mean scores of 4.06, 4.22 and 4.35 respectively, there was no significant difference in their adoption of agricultural innovations. And between those who were illiterates with no educational qualifications with a mean of 3.97 and primary school leavers with a mean of 3.94 there is no

Table 5: Summary of Scheffe's post-hoc analysis of source of difference in adoption of innovations by levels of qualifications

Mean	Educational qualifications	Pri-mary	No. qua-lifications	O' level/ Diploma	Gradua tes	Others
3.9469	Primary			*	*	*
3.9778	No. qualifications			*	*	*
4.0604	O' level / Diploma	*	*			
4.2249	Graduates	*	*			
4.3537	Others	*	*			

* Denotes pairs of groups significantly different at the 0.05 level

significant difference either. But between the two groups of primary school leavers and illiterates with no educational qualifications on the one hand, and the three groups of O'level / diploma holders, graduates and "others", there is significant difference.

The finding in this study is corroborated by the earlier findings of Osuji (1983:43) and Okoye (1989:15) that the rate of adoption is positively related to the level of education. Chaudhri as reported in Okoye (1980:15) in fact established that farmers with more than eight years of schooling adopted innovations more than the farmers with less years of education. Their level of education helps them to get convinced about the recommended innovations.

Hypothesis 2: There is no significant difference in the adoption of agricultural innovations / technologies by small-scale, medium scale and large-scale farmers.

From the ANOVA summary Table 6b, null hypothesis 2 is rejected because the F' critical value of 2.39 is less than the calculated F / value of 8.8598. There is therefore a significant difference in the adoption of agricultural innovations / technologies by the three categories of farmers.

Table 6a: Comparative analysis of categories of farmers and adoption of innovations (One-way ANOVA)

Group	Comparison of adoption of innovations by categories of farmers			
	N	$\overline{X}$	SD	SE
Small-scale	350	4.0171	0.6427	0.0344
Medium-scale	128	4.272	0.4947	0.0437
Large-scale	17	4.4434	0.3510	0.0851

Table 6b: ANOVA summary table

Source	DF	SS	MS	F' Ratio	F' Crit	P
Between groups	2	6.3821	3.1910	8.8598	2.39	0.0002*
Within groups	492	177.2035	0.3602			
Total	**494**	**183.5856**				

* Significant; p = < 0,05

Table 7 shows the result of the Scheffe's Difference Test namely among which scales of farming the differences in the adoption of innovations existed.

Table 7: Summary of Scheffe's post-hoc analysis of source of difference in the adoption of innovation by the categories of farmers

Mean	Categories of farmers	Small scale	Medium scale	Large scale
4.0171	Small-scale		*	*
4.2272	Medium Scale	*		
4.4434	Large scale	*		

(*) Denotes pairs of groups significantly different at the 0.05 level

Between medium and large-scale farmers there was no significant difference in the adoption of agricultural innovations. Their mean scores stood at 4.22 and 4.44 respectively. However, between these two groups and small-scale farmers with a mean score of 4.01 there was significant difference in the adoption level of agricultural innovations. Therefore, medium and large-scale farmers in this study adopted agricultural innovations more than small-scale farmers. This finding is consistent with that of Akanya *et al* (1991:88) that farm size had significant relationship to adoption of agricultural innovations among farmers in Borno State. The large- and medium-scale farmers may want to maximise agricultural productivity more than the small-scale farmers by embracing innovations more readily. This is because they probably have more economic power and other resources, which they can afford to commit to the inputs that go into their farms than the small-scale farmers.

Hypothesis 3: There is no significant difference in the mean perception of respondents of various information access times in the adoption of innovations.

Table 8a: Comparative analysis of information access time and adoption of innovations (One-way ANOVA) (N = 495

Information access time	Comparison of information access time and adoption			
	N	$\overline{X}$	SD	SE
1 – 5 years	102	3.7624	0.7026	0.0696
6 – 10 years	109	4.0402	0.5092	0.0488
11 – 15 years	86	4.1771	0.5799	0.0625
16 – 20 years	90	4.2513	0.5638	0.0594
> 20 years	108	4.2279	0.5519	0.0531

Table 8b: ANOVA summary table

Source	DF	SS	MS	F' Ratio	F' Crit	P
Between groups	4	16.2543	4.0636	11.8995	2.39	0.0000*
Within groups	490	167.3313	0.3415			
Total	**494**	**183.5856**				

* Significant; p = <0.05

At F' critical of 2.39 and F' calculated value of 11.8995 (Table 8b), there is a significant difference between farmers' information access time and adoption of innovations. Null hypothesis 3 is therefore rejected.

Table 9 is the result of the Scheffe's Difference test showing the groups of information access time among which the differences existed.

Among the last four groups, i.e. 6 to 10, 11 to 15, 16 to 20 and more than 20 years, there was no significant difference in terms of their adoption of agricultural innovations. But between these four groups and the first group with 1 to 5 years access to NAERLS information and information services there is a significant difference in terms of adoption of agricultural innovations. Long and sustained access to information services empower the farmer to have confidence in the information provided, and consequently accept the recommended innovations. This is unlike with regard to the farmer with short time of access to information, who probably because of his scepticism of the information received may hesitate or even refuse to adopt the recommended innovations.

The implication of this finding is that the longer a farmer has access to agricultural information, the more likely he would adopt agricultural

innovations. This is consistent with the finding of Osuji (1983:44), which revealed that the adoption of new practices among farmers involved time dimension.

5. CONCLUDING REMARK

The findings of this study are very instructive for agricultural extension planning and execution. The rate of adoption is positively related to the level of education since farmers' level of education facilitates their acceptance of recommended innovations and technologies. Farm size also has significant relationship to adoption of agricultural innovations by farmers. The large- and medium-scale farmers may want to maximize agricultural productivity to a greater extent than the small-scale farmers, by embracing innovations readily. This is because they have probably more economic power and other resources, which they can commit to inputs that go into their farms than the small-scale farmers. There is time dimensions to the adoption of new practices among farmers, thus the longer a farmer has access to agricultural information, the more likely he would adopt agricultural innovations / technologies.

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